

REMARKS

No new matter is believed to be added to the application by this Amendment.

Status of the Claims

Claims 1, 3, 5, 7, 9, 11, 13, 15, 17, 41-46 and 52-57 are pending in the application and stand rejected. Claims 19-32 and 37-40 have been withdrawn from consideration by the Examiner. Claim 15 has been amended to stand as an independent claim by incorporating the subject matter of claim 1.

Rejection Under 35 U.S.C. §103(a) over Imoto in View of Furuya and Shacklette (paragraph 5 of Office Action)

Claims 1, 3, 7, 9, 11, 41-46 and 55-57 are rejected under 35 U.S.C. §103(a) as being obvious over Imoto (U.S. Patent 5,497,445) in view of Furuya (U.S. Patent 4,464,762) and Shacklette (U.S. Patent 5,850,498). Applicants traverse.

The present invention pertains to an organic waveguide that includes a core section formed from an organic polymer and a clad layer formed from an inorganic material such as SiO₂. As shown in, for example, Fig. 1 of the Application, the clad layer and the core section have substantially the same shape such that the clad layer covers the core section.

As a result, the invention achieves an objective of providing optical elements near a core section on a substrate, and integrating an organic waveguide on the substrate on which the optical elements are provided. This objective is neither disclosed nor suggested by the prior art references utilized by the Examiner.

In a second embodiment of the invention, an adhesive layer can be provided between the clad layer and the core section so as to prevent delamination of the clad layer. See claim 15.

Distinctions of the invention over Imoto are of record in the Application. Imoto fails to disclose or suggest that the clad section has substantially the same shape and closely conforms to the core section, such as set forth in independent claims 1 and 52. Imoto additionally pertains to a nitrogen-containing inorganic material that is substantially different from the SiO₂ clad layer of the invention.

The Examiner turns to Furuya for teachings pertaining to cladding layers formed from silicon oxide. However, Furuya describes a single use of a silicon oxide as a material of a cladding material layer at column 8, lines 29-35 and at column 10, lines 35-40. As a result, the utilization of silicon oxide of Furuya is more highly restricted than the inorganic dielectric made of silicon oxide having a lower refractive index than that of the core section, as set forth in independent claims 1 and 52. Furuya also fails to disclose or suggest that the clad section has substantially the same shape and

closely conforms to the core section, such as set forth in independent claims 1 and 52.

The Examiner then turns to Shacklette for teachings pertaining to a cladding layer having conformal shape. However, Shacklette uses a polymeric core having a plurality of edges and a polymeric cladding such that no inorganic material, such as SiO₂ can be used. See, e.g., Shacklette at column 5, lines 29-31. That is, claims 1 and 13 of Shacklette recite "a substantially transparent shaped polymeric core having a plurality of edges, which core is attached on and raised from a surface of the substrate on one edge of the core, and a shaped, polymeric, light reflecting cladding." On the other hand, the present invention has a core section made of a polymer and a clad section that is formed by an inorganic material such as SiO₂.

Further, it is not possible to adopt a sputtering method or CVD method to form a clad layer from a polymer, such as is the case in Shacklette. As a result, a fundamentally different manufacturing process would be required to form the clad layer of Shacklette, as opposed to the sputtering or CVD used in the present invention. As a result, Shacklette comes from non-analogous art.

Yet further, in the case of forming a core section from a polymer and forming a clad layer of an inorganic material (as in the present invention), a thin clad layer does not ensure sufficient adherence between the core section and the clad layer. This may cause delamination of the clad layer. As a result, both Imoto and

Furuya adopt an arrangement in which the core section is buried or caught in the clad layer.

As a result, a person of ordinary skill in the art would not be motivated to combine Imoto, Furuya and Shacklette to produce a claimed embodiment of the present invention. Thus, a *prima facie* case of obviousness is not been made over Imoto, Furuya and Shacklette.

Accordingly, this rejection is overcome and withdrawal thereof is respectfully requested.

Rejection Under 35 U.S.C. §103(a) over Imoto, Furuya and Shacklette in view of Tabuchi (paragraph 6 of Office Action)

Claims 52-54 are rejected under 35 U.S.C. §103(a) as being unpatentable over Imoto, Furuya and Shacklette in view of Tabuchi (U.S. Patent 6,122,002). Applicants traverse.

The inability of Imoto, Furuya and Shacklette to suggest a claimed embodiment of the invention has been discussed above. The Examiner adds the teachings of Tabuchi to reject claims 52-54.

In making his rejection, the Examiner turns to Tabuchi for teachings pertaining to forming an optical element and waveguide on a single substrate. However, Tabuchi fails to address the inability of Imoto, Furuya and Shacklette to suggest a claimed embodiment of the invention. Thus, a *prima facie* case of obviousness has not been made

over Imoto, Furuya and Shacklette. Accordingly, this objection has been overcome and withdrawal thereof is respectfully requested.

Rejection Under 35 U.S.C. §103(a) over Imoto, Furuya, Shacklette and Thomas (paragraph 7 of Office Action)

Claim 5 is rejected under 35 U.S.C. §103(a) as being unpatentable over Imoto, Furuya and Shacklette, discussed above, and further in view of Thomas (U.S. Patent 5,235,663). Applicants traverse.

The inability of Imoto, Furuya and Shacklette to suggest a claimed embodiment of the invention has been discussed above. The Examiner turns to Thomas for teaching pertaining to surrounding the core and clad layer with an opaque jacket comprising a metal film. However, Thomas fails to address the deficiencies of Imoto, Furuya and Shacklette in suggesting a claimed embodiment of the invention.

Accordingly, this rejection is overcome and withdrawal thereof is respectfully requested.

Rejection Under 35 U.S.C. §103(a) over Imoto, Furuya, Shacklette and Maruo (paragraph 8 of Office Action)

Claims 13, 15 and 17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Imoto, Furuya, Shacklette, discussed above, and further in view of Maruo (U.S. Patent 5,572,619). Applicants traverse.

The inability of Imoto, Furuya, Shacklette to disclose or suggest a claimed embodiment of the invention has been discussed above. The Examiner turns to Maruo for teachings pertaining to a core of fluorinated polyimide and to an adhesive layer.

A claimed embodiment of the invention pertains to the utilization of an adhesive layer to improve adhesion between the core section and the clad layer so as to prevent delamination, i.e., preventing removal of the clad layer. See claims 15 and 17. Although Maruo may refer to an adhesive at column 8, line 37-42, the clad layer and core section of Maruo are not made in substantially the same space, and the adhesive is not provided for the purpose of preventing the removal of the clad layer. Thus, a person having ordinary skill in the art would not combine Maruo with the other references to produce a claimed embodiment of the invention. Further, Maruo fails to address the deficiencies of Imoto, Furuya, and Shacklette in producing a claimed embodiment of the invention. That is, while Maruo may describe a core layer of fluorinated polyimide, Shacklette (in contrast) uses a photopolymerizable compound as the material of the core section and the clad layer. This photopolymerizable compound has high cost, which narrows the range of material selection. Also, Shacklette has no teaching or suggestion of a way to prevent removal of a clad layer formed from inorganic material.

As a result, a person having ordinary skill in the art would not be motivated to combine the four references of Imoto, Furuya, Shacklette and Maruo to produce a claimed embodiment of the invention. As a result, a *prima facie* case of obviousness has not been made over Imoto, Furuya, Shacklette and Maruo.

Accordingly, this rejection is overcome and withdrawal thereof is respectfully requested.

CONCLUSION


Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert E. Goozner (Reg. No. 42,593) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Pursuant to the provisions of 37 C.F.R. §§ 1.17 and 1.136(a), the Applicant respectfully petitions for a one (1) month extension of time for filing a response in connection with the present application and the required fee of \$110.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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MARKED UP COPY SHOWING CHANGES MADE

IN THE CLAIMS:

The claims have been amended as follows:

15. (Amended) [The organic waveguide as set forth in claim 1,]

An organic waveguide comprising:

a substrate;

a buffer layer over the substrate;

a core section over the buffer layer, the core section being made of organic polymer; and

a clad section covering an upper surface of the core section and made of inorganic dielectric having a lower refractive index than that of the core section, the inorganic dielectric consisting essentially of silicon oxide, and the clad section has substantially the same shape and closely conforms to the core section, wherein an adhesive layer for improving adhesion between the organic polymer and the inorganic dielectric is provided between the core section and the clad section.